Ephemeris for Physical Observations

Greenwich Noon.	Position-angle of ♃'s Axis. P	L−O	Diff.	B	Annual Parallax. A−L	Apparent Diameter. Equat. 2a	Defect.	Polar. 2b
1895.	°	°		°	°	"	"	"
Aug. 30	13·598	343·587	394	+1·051	−6·796	33·43	0·12	31·33
Sept. 1	13·750	343·981	389	1·035	7·026	33·53	·13	31·43
3	13·900	344·370	384	+1·019	−7·251	33·64	0·13	31·53
5	14·047	344·754	380	1·003	7·472	33·76	·14	31·64
7	14·192	345·134	375	0·988	7·688	33·88	·15	31·75
9	14·334	345·509	369	·972	7·899	34·00	·16	31·87
11	14·473	345·878	364	·957	8·104	34·13	·17	31·99
13	14·609	346·242	358	+0·941	−8·304	34·27	0·18	32·12
15	14·743	346·600	352	·925	8·498	34·41	·19	32·25
17	14·874	346·952	346	·910	8·687	34·55	·20	32·38
19	15·002	347·298	339	·894	8·870	34·70	·21	32·52
21	15·127	347·637	333	·879	9·046	34·85	·22	32·66
23	15·249	347·970	326	+0·864	−9·215	35·01	0·23	32·81
25	15·367	348·296	319	·849	9·378	35·17	·23	32·96
27	15·483	348·615	312	·834	9·534	35·33	·24	33·11
29	15·596	348·927	305	·819	9·683	35·50	·25	33·27
Oct. 1	15·705	349·232	297	·805	9·824	35·67	·26	33·44
3	15·811	349·529	288	+0·790	−9·957	35·85	0·27	33·61
5	15·914	349·817	280	·775	10·082	36·04	·28	33·78
7	16·014	350 097	272	·761	10·200	36·22	·29	33·95
9	16·110	350·369	263	·747	10·309	36·41	·29	34·13
11	16·202	350·632	255	·733	10·409	36·61	·30	34·31
13	16·291	350·887	245	+0·720	−10·500	36·81	0 31	34·50
15	16·376	351·132	236	·706	·583	37·01	·31	34·69
17	16·458	351·368	226	·693	·656	37·22	·32	34·89
19	16·536	351·594	216	·680	·719	37·43	·33	35·09
21	16·611	351·810	205	·668	·772	37·65	·33	35·29
23	16·682	352·015	196	+0·655	−10·815	37·87	0·34	35·49
25	16·749	352·211	185	·643	·848	38·09	·34	35·70
27	16·812	352·396	174	·631	·870	38·32	·34	35·91
29	16·872	352·570	162	·619	·881	38·55	·35	36·13
31	16·927	352·732	151	·608	·881	38·78	·35	36·34
Nov. 2	16·979	352·883	140	+0·597	−10·870	39·01	0·35	36·56

of Jupiter, 1895–96. By A. Marth.

Greenwich Noon.	Bright-ness in Star Magn.	Longitude of ♃'s Central Meridian. (877°·90) I.	(870°·27) II.	Corr. for Phase.	Light-time.	A−O	B
1895.	m	°	°	°	m	°	°
Aug. 30	−1·45	83·43	311·62	+0·20	49·833	336·7944	+1·2083
Sept. 1	−1·45	38·94	251·86	·21	49·674	336·9582	1·2002
3	−1·46	354·45	192·11	+0·23	49·509	337·1220	+1·1921
5	−1·47	309·97	132·37	·24	49·339	337·2858	1·1840
7	−1·47	265·49	72·63	·26	49·164	337·4495	1·1759
9	−1·48	221·03	12·91	·27	48·984	337·6132	1·1678
11	−1·49	176·57	313·19	·29	48·798	337·7769	1·1597
13	−1·50	132·13	253·48	+0·30	48·608	337·9405	+1·1515
15	−1·50	87·69	193·78	·31	48·412	338·1041	1·1434
17	−1·51	43·26	134·09	·33	48·212	338·2676	1·1353
19	−1·52	358·83	74·41	·34	48·007	438.4311	1·1272
21	−1·53	314·42	14·74	·36	47·798	338·5945	1·1190
23	−1·54	270·02	315·07	+0·37	47·585	338·7579	+1·1108
25	−1·55	225·63	255·42	·38	47·367	338·9212	1·1027
27	−1·56	181·24	195·77	·40	47·146	339·0845	1·0945
29	−1·57	136·87	136·14	·41	46·920	339·2477	1·0863
Oct. 1	−1·58	92·50	76·51	·42	46·691	339·4109	1·0781
3	−1·59	48·15	16·89	+0·43	46·459	339·5741	+1·0699
5	−1·60	3·80	317·29	·44	46·224	339·7372	1·0617
7	−1·61	319·47	257·69	·45	45·985	339·9003	1·0535
9	−1·62	275·14	198·11	·46	45·743	340·0633	1·0452
11	−1·63	230·83	138·53	·47	45·499	340·2263	1·0370
13	−1·64	186·53	78·96	+0·48	45·252	340·3892	+1·0288
15	−1·66	42·23	19·41	·49	45·003	340·5521	1·0206
17	−1·67	97·95	319·87	·49	44·752	340·7149	1·0124
19	−1·68	53·68	260·33	·50	44·499	340·8777	1·0042
21	−1·69	9·42	200·81	·50	44·244	341·0404	0·9959
23	−1·70	325·17	141·30	+0·51	43·988	341·2031	+0·9876
25	−1·72	280·93	81·80	·51	43·731	341·3657	·9794
27	−1·73	236·70	22·31	·51	43·473	341·5283	·9711
29	−1·74	192·48	322·83	·52	43·214	341·6909	·9628
31	−1·75	148·28	263·37	·51	42·955	341·8534	·9545
Nov. 2	−1·77	104·09	203·91	+0·51	42·696	342·0159	+0·9462

P P

Greenwich Noon.		Position-angle of ♃'s Axis. P	L−O.	Diff.	B	Annual Parallax. Λ−L.	Apparent Diameter. Equat. 2a	Defect.	Polar. 2b
1895.		°	°		°	°	″	″	″
Nov.	4	17·026	353·023	128	·586	·847	39·25	·35	36·79
	6	17·070	353·151	117	·575	·813	39·49	·35	37·01
	8	17·109	353·268	104	·565	·767	39·73	·35	37·24
	10	17·145	353·372	92	·554	·709	39·98	·35	37·47
	12	17·176	353·464	79	+0·545	−10·638	40·22	0·35	37·70
	14	17·203	353·543	67	·536	·555	40·47	·34	37·93
	16	17·225	353·610	54	·527	·460	40·72	·34	38·17
	18	17·244	353·664	40	·519	·352	40·97	·33	38·40
	20	17·258	353·704	27	·511	·230	41·22	·33	38·63
	22	17·268	353·731	14	+0·503	−10·095	41·47	0·32	38·87
	24	17·273	353·745	2	·496	9·947	41·72	·31	39·10
	26	17·274	353·747	12	·489	9·787	41·97	·31	39·34
	28	17·271	353·735	25	·483	9·613	42·22	·30	39·57
	30	17·263	353·710	38	·477	9·426	42·46	·29	39·80
Dec.	2	17·251	353·672	52	+0·471	−9·226	42·71	0·28	40·03
	4	17·235	353·620	64	·466	9·013	42·95	·27	40·25
		17·215	353·556	77	·461	8·787	43·19	·25	40·48
	8	17·190	353·479	91	·457	8·548	43·42	·24	40·70
		17·160	353·388	103	·453	8·296	43·65	·23	40·91
	12	17·127	353·285	115	+0·449	−8·031	43·88	0·22	41·12
	14	17·089	353·170	128	·446	7·754	44·10	·20	41·33
	16	17·047	353·042	140	·444	7·465	44·31	·19	41·53
	18	17·001	352·902	152	·442	7·163	44·52	·17	41·73
	20	16·950	352·750	163	·440	6·850	44·72	·16	41·92
	22	16·896	352·587	174	+0·439	−6·526	44·91	0·15	42·10
	24	16·838	352·413	184	·438	6·191	45·10	·13	42·27
	26	16·776	352·229	194	·438	5·845	45·28	·12	42·44
	28	16·711	352·035	204	·438	5·490	45·45	·10	42·60
	30	16·642	351·831	213	·438	5·125	45·60	·09	42·74
1896. Jan.	1	16·570	351·618		+0·439	−4·751	45·75	0·08	42·88

Greenwich Noon.	Brightness in Star Magn.	Longitude of ♃'s Central Meridian. (877°·90) I.	(870°·27) II.	Corr. for Phase.	Light-time.	A – O	*B*
1895.	m	°	°	°	m	°	°
Nov. 4	–1·78	59·91	144·47	·51	42·438	342·1783	·9379
6	–1·79	15·73	85·04	·51	42·179	342·3407	·9296
8	–1·81	331·57	25·62	·50	41·922	342·5030	·9213
10	–1·82	287·43	326·21	·50	41·665	342·6653	·9130
12	–1·83	243·29	266·81	+0·49	41·410	342·8276	+0·9047
14	–1·84	199·17	207·42	·49	41·156	342·9898	·8964
16	–1·86	155·05	148·05	·48	40·905	343·1520	·8881
18	–1·87	110·95	88·69	·47	40·656	343·3141	·8798
20	–1·88	66·86	29·34	·46	40·409	343·4761	·8715
22	–1·90	22·78	330·00	+0·44	40·165	343·6381	+0·8631
24	–1·91	338·71	270·67	·43	39·925	343·8001	·8548
26	–1·92	294·66	211·35	·42	39·688	343·9620	·8465
28	–1·94	250·61	152·04	·40	39·455	344·1239	·8382
30	–1·95	206·58	92·74	·39	39·226	344·2857	·8298
Dec. 2	–1·96	162·55	33·46	+0·37	39·002	344·4475	+0·8214
4	–1·97	118·54	334·18	·35	38·783	344·6093	·8131
6	–1·99	74·53	274·91	·34	38·569	344·7710	·8047
8	–2·00	30·53	215·66	·32	38·361	344·9327	·7963
10	–2·01	346·55	156·41	·30	38·158	345·0943	·7879
12	–2·02	302·57	97·17	+0·28	37·962	345·2559	+0·7795
14	–2·03	258·60	37·94	·26	37·772	345·4174	·7711
16	–2·04	214·64	338·72	·24	37·589	345·5789	·7627
18	–2·05	170·69	279·51	·22	37·413	345·7404	·7543
20	–2·06	126·74	220·30	·20	37·244	345·9018	·7459
22	–2·07	82·80	161·10	+0·18	37·083	346·0632	+0·7375
24	–2·08	38·87	101·91	·17	36·931	346·2245	·7291
26	–2·09	354·94	42·72	·15	36·787	346·3858	·7207
28	–2·10	311·02	343·54	·13	36·651	346·5470	·7123
30	–2·11	267·10	284·36	·11	36·524	346·7082	·7039
1896 Jan. 1	–2·11	223·19	225·18	+0·10	36·407	346·8694	+0·6954

The angle L—O+180° is the jovicentric longitude of the Earth, reckoned in the assumed plane of *Jupiter's* equator from O, the point of the vernal equinox of *Jupiter's* northern hemisphere, or the point of the descending node of the planet's equator on its orbit. B denotes the jovicentric latitude of the Earth above *Jupiter's* equator, Λ − L the difference between the longitudes of the Sun and of the Earth.

The apparent diameters of the disc of *Jupiter* depend on Barnard's measurements, published in No. 325 of *Gould's Astron. Journal*, allowance being made for the Earth's latitude above the plane of *Jupiter's* equator. If $\cos \epsilon_0$ denotes the ratio of the polar axis of the planet's spheroid to its equatorial diameter, and $\cos \epsilon$ the ratio of the apparent diameters of the disc as seen from a distant point in latitude B, the connection between $\cos \epsilon$ and $\cos \epsilon_0$ is found from the equation $\sin \epsilon = \sin \epsilon_0 \cos B$.

Hence

$$\cos \epsilon = \cos \epsilon_0 \sqrt{1 + \tan^2 \epsilon_0 \sin^2 B}$$
$$= \cos \epsilon_0 \,.\, \sec \nu, \text{ if } \tan \nu = \tan \epsilon_0 \sin B.$$
$$\cos \epsilon_0 = \cos \epsilon \sqrt{1 - \tan^2 \epsilon \tan^2 B}$$
$$= \cos \epsilon \,.\, \cos \gamma, \text{ if } \sin \gamma = \tan \epsilon \tan B.$$

The formulæ for finding the differences of tangents to the limbs in right ascension and declination and the defects of illumination are given in vol. xlv., p. 508.

The longitudes of *Jupiter's* central meridian are computed with the values of the rates of rotation and of the zero meridians adopted in the preceding ephemerides. The addition of the "Corr. for Phase" gives the longitudes of the meridian which bisects the illuminated disc. The following is a list of Greenwich mean times when the adopted zero meridians in the assumed two systems of longitudes will pass the middle of the illuminated disc :—

1895.	I. (877°·90) h m	II. (870°·27) h m	1895.	I. (877°·90) h m	II. (870°·27) h m
Aug. 30	17 24·0	21 11·3	Sept. 10	19 9·9	15 21·2
31	22 55·8	17 2·8	11	14 51·0	21 8·5
Sept. 1	18 37·0	22 50·1	12	20 22·8	17 0·0
2	14 18·1	18 41·7	13	16 3·9	22 47·3
3	19 49·9	14 33·2	14	21 35·6	18 38·8
4	15 31·1	20 20·5	15	17 16·8	14 30·3
5	21 2·9	16 12·1	16	22 48·5	20 17·6
6	16 44·0	21 59·4	17	18 29·6	16 9·1
7	22 15·8	17 50·9	18	14 10·8	21 56·3
8	17 57·0	23 38·2	19	19 42·5	17 47·8
9	23 28·7	19 29·7	20	15 23·6	23 35·0

1895.	I. (877°·90)	II. (870°·27)	1895.	I. (877°·90)	II. (870°·27)
	h m	h m		h m	h m
Sept. 21	20 55·3	19 26·5	Oct. 21	9 34·2	14 18·3
22	16 36·4	15 18·0		19 24·8	24 14·0
23	22 8·1	21 5·2	22	15 5·8	10 9·7
24	17 49·2	16 56·7		24 56·3	20 5·3
25	13 30·6	12 48·2	23	10 46·8	15 56·7
	23 20·9	22 43·9		20 37·3	25 52·4
26	19 2·0	18 35·4	24	16 18·3	11 48·1
27	14 43·1	14 26·9	25	11 59·4	17 35·2
28	0 33·7	0 22·6	26	17 30·9	13 26·5
	20 14·8	20 14·0	27	13 11·9	9 17·9
29	15 55·9	16 5·5		23 2·4	19 13·5
30	21 27·6	21 52·7	28	18 43·4	15 5·0
Oct. 1	17 8·7	17 44·1	29	14 24·4	10 56·3
2	12 49·8	13 35·6		24 14·9	20 52·0
	22 40·3	23 31·3	30	19 55·9	16 43·4
3	18 21·4	19 22·8	31	15 36·9	12 34·7
4	14 2·5	15 14·2	Nov. 1	11 17·9	8 26·1
5	19 34·1	21 1·4		21 8·4	18 21·8
6	15 15·2	16 52·8	2	16 49·4	14 13·1
7	10 56·3	12 44·3	3	12 30·4	10 4·4
	20 46·8	22 40·0		22 20·9	20 0·1
8	16 27·9	18 31·4	4	8 11·4	15 51·4
9	12 9·0	14 22·8		18 1·9	25 47·1
	21 59·5	24 18·6	5	13 42·9	11 42·8
10	17 40·6	20 10·0		23 33·4	21 38·4
11	13 21·6	16 1·4	6	9 23·9	7 34·1
	23 12·2	25 57·1		19 14·3	17 29·8
12	18 53·2	21 48·5	7	14 55·3	13 21·1
13	14 34·3	17 40·0		24 45·8	23 16·8
14	10 15·4	13 31·4	8	10 36·3	9 12·4
	20 5·9	23 27·1		20 26·8	19 8·1
15	15 46·9	19 18·5	9	16 7·7	14 59·4
16	21 18·5	15 9·9	10	1 58·2	0 55·1
17	16 59·6	20 57·0		11 48·7	10 50·7
18	12 40·6	16 48·4		21 39·2	20 46·4
19	18 12·2	12 39·8	11	17 20·1	16 37·7
20	13 53·2	8 31·2	12	13 1·1	12 29·0
	23 43·7	18 26·9		22 51·6	22 24·7

1895.	I. (877°·90) h m	II. (870°·27) h m	1895.	I. (877°·90) h m	II. (870°·27) h m
Nov. 13	8 42·0	8 20·3	Dec. 4	6 35·4	10 37·8
	18 32·5	18 16·0		16 25·9	20 33·4
14	14 13·5	14 7·3	5	12 6·8	6 29·0
15	0 3·9	0 2·9		21 57·2	16 24·6
	9 54·4	9 58·6	6	7 47·6	12 15·8
	19 44·9	19 54·2		12 16	Sat. III. Sh.
16	15 25·8	15 45·5		17 38·1	22 11·4
17	11 6·8	11 36·8	7	13 19·0	8 7·0
	20 57·2	21 32·5		23 4·4	18 2·7
18	16 38·2	17 23·8	8	8 59·8	13 53·9
19	12 19·1	13 15·1		18 50·3	23 49·5
	22 9·6	23 10·7	9	14 31·1	9 45·1
20	8 0·1	9 6·3		18 19	Sat. IV. Sh.
	17 50·5	19 2·0		24 21·6	19 40·7
21	13 31·5	14 53·3	10	10 12·0	5 36·3
	23 21·9	24 48·9		20 2·4	15 31·9
22	9 12·4	10 44·5	11	5 52·9	11 23·2
	19 2·8	20 40·2		15 43·3	21 18·8
23	0 20	Sat. IV. Shadow crossing central Meridian.	12	11 24·2	7 14·4
				21 14·6	17 10·0
	14 43·8	16 31·5	13	7 5·0	13 1·2
24	10 24·7	12 22·7		16 14	Sat. III. Sh.
	20 15·1	22 18·4		16 55·4	22 56·8
25	15 56·0	18 9·6	14	12 36·3	8 52·4
26	11 36·9	14 0·9		22 26·7	18 48·0
	21 27·4	23 56·5	15	8 17·2	14 39·2
27	7 17·8	9 52·1		18 7·6	24 34·8
	17 8·3	19 47·8	16	13 48·4	10 30·4
28	12 49·2	15 39·0		23 38·9	20 26·0
29	8 30·1	11 30·3	17	9 29·3	6 21·6
	18 20·5	21 25·9		19 19·7	16 17·2
30	14 1·5	17 17·2	18	5 10·1	12 8·4
Dec. 1	9 42·3	13 8·4		15 0·6	22 4·0
	19 32·8	23 4·0	19	10 41·4	7 59·6
2	5 23·4	8 59·7		20 31·8	17 55·2
	15 13·7	18 55·3	20	16 12·7	13 46·4
3	10 54·6	14 46·5		20 14	Sat. III. Sh.
	20 45·0	24 42·1	21	11 53·5	9 37·6

	I. (877°·90)	II. (870°·27)		I. (877°·90)	II. (870°·27)
1895	h m	h m	1895	h m	h m
Dec. 21	21 43·9	19 33 2	Dec. 26	19 48·9	18 40·2
22	7 34·3	5 28·8	27	15 29·7	14 31·4
	17 24·7	15 24·3	28	11 10·5	10 22·6
23	13 5·6	11 15·5		21 0·9	20 18·2
	22 56·0	21 11·1	29	6 51·3	6 13·8
24	8 46·4	7 6·1		16 41·7	16 9·4
	18 36·8	17 2·3	30	12 22·6	12 0·5
25	14 17·6	12 53·5		22 13·0	21 56·1
26	9 58·5	8 44·7	31	8 3·4	7 51·7
	12 18	Sat. IV. Sh.		17 53·8	17 47·3

(*To be continued in the Supplementary Number.*)

Colonel Cooper's Observatory,
Markree, Collooney, Ireland.

Correction.

Mr. Barnard's attention has been called by Mr. T. J. Moore, of Doncaster, England, to an error in the value given in Mr. Barnard's paper on *Saturn*, *Monthly Notices*, vol. lv. p. 377.

For the polar compression

$$C=\frac{E-P}{E}$$

should be $\frac{1}{12\ 35}$

instead of $\frac{1}{11{\cdot}44}$.